Climate4you update June 2010

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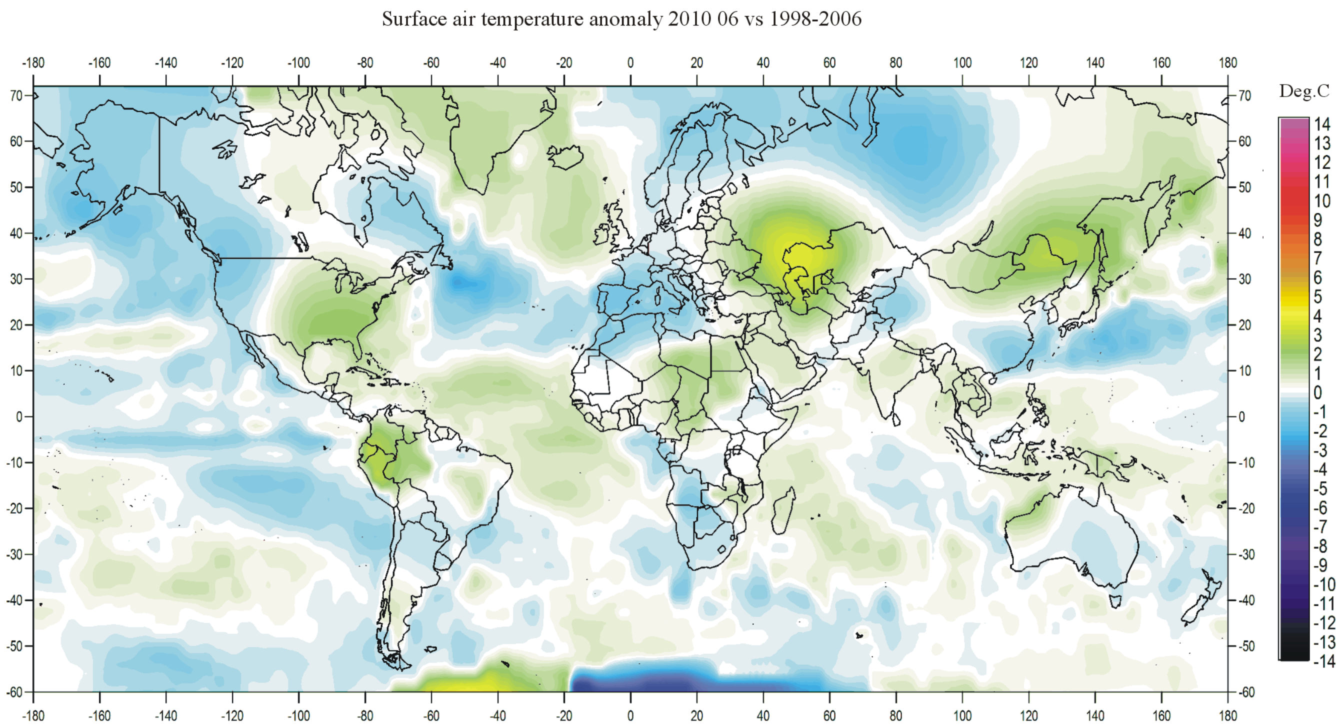
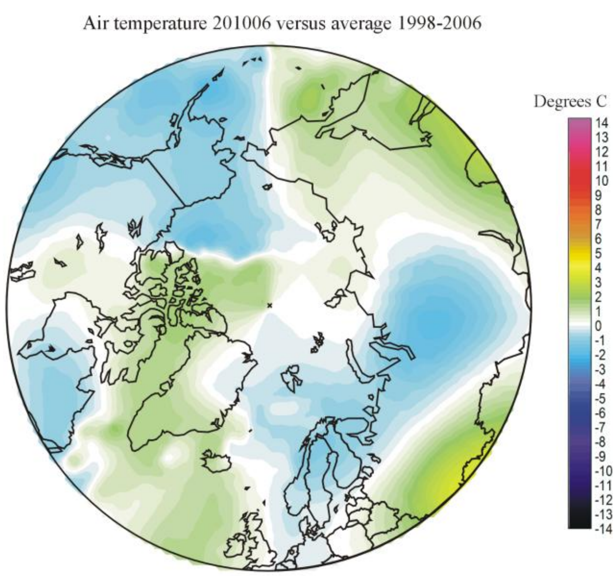
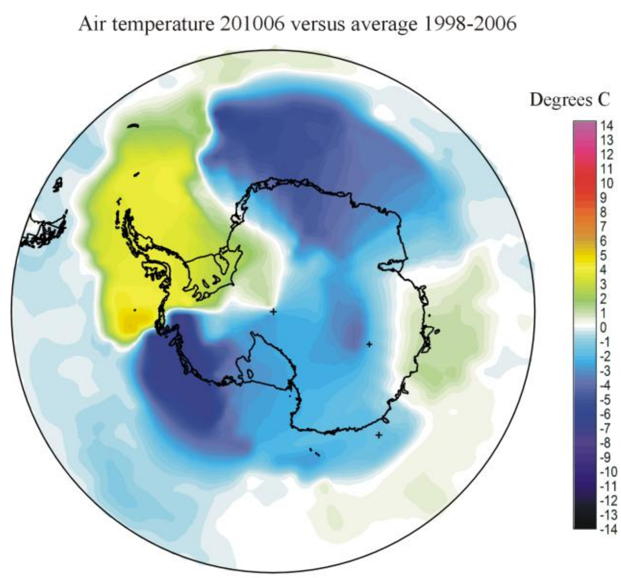
[June 2010 global surface air temperature overview]()







June 2010 surface air temperature compared to the average for May 1998-2006. Green.yellow-red colours indicate areas with higher temperature than the 1998-2006 average, while blue colours indicate lower than average temperatures. Data source: [Goddard Institute for Space Studies]() (GISS)

Comments to the June 2010 global surface air temperature overview

This newsletter contains graphs showing a selection of key meteorological variables for June 2010. All temperatures are given in degrees Celsius.

In the above maps showing the geographical pattern of surface air temperatures, the period 1998-2006 is used as reference period. The reason for comparing with this recent period instead of the official WMO ‘normal’ period 1961-1990, is that the latter period is affected by the relatively cold period 1945-1980. Almost any comparison with such a low average value will therefore appear as high or warm, and it will be difficult to decide if modern surface air temperatures are increasing or decreasing. Comparing with a more recent period overcomes this problem. In addition to this consideration, the recent temperature development suggests that the time window 1998-2006 may roughly represent a global temperature peak. If so, negative temperature anomalies will gradually become more and more widespread as time goes on. However, if positive anomalies instead gradually become more widespread, this reference period only represented a temperature plateau.

In the other diagrams in this newsletter the thin line represents the monthly global average value, and the thick line indicate a simple running average, in most cases a 37-month average, almost corresponding to three years.

The year 1979 has been chosen as starting point in several of the diagrams, as this roughly corresponds to both the beginning of satellite observations and the onset of the late 20th century warming period.

Global surface air temperatures June 2010 in the Northern Hemisphere was characterised by relatively cold conditions in Alaska, western Canada and USA, and in a band extending from eastern Canada across the North Atlantic to Europe and northern Siberia. Eastern USA, southern Russia and eastern Siberia and parts of NE China were relatively warm. The Southern Hemisphere generally experienced smaller regional temperature contrasts than the Northern Hemisphere.

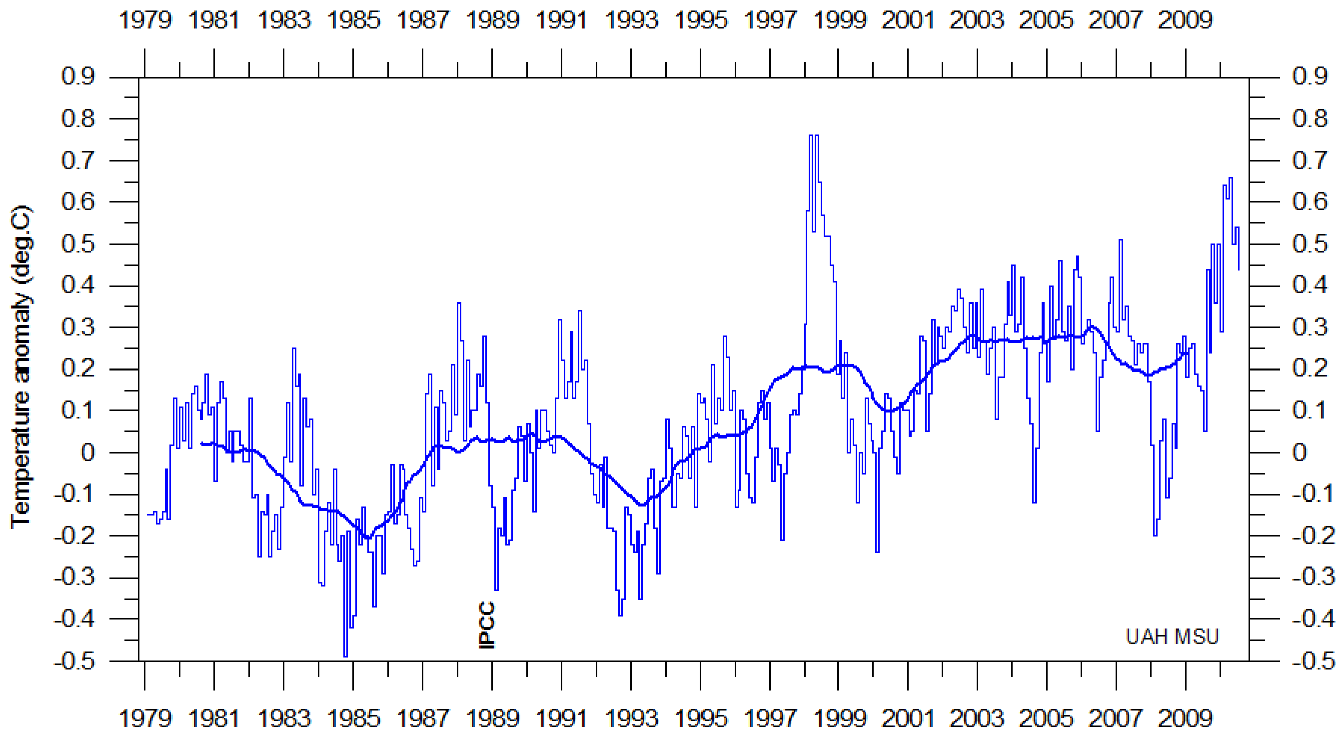
Conditions near Equator were influenced by the weakening El Niño in the Pacific Ocean, and relatively low temperatures are beginning to characterise a major part of the Equatorial regions in June. A warm region, however, still extended from northern South America across the Atlantic to Africa.

In the Arctic, according to the GISS data, a band of relatively high temperatures extended from southern Greenland to NE Canada. Most of the Arctic, however, was relatively cold or near average conditions for the period 1998-2006.

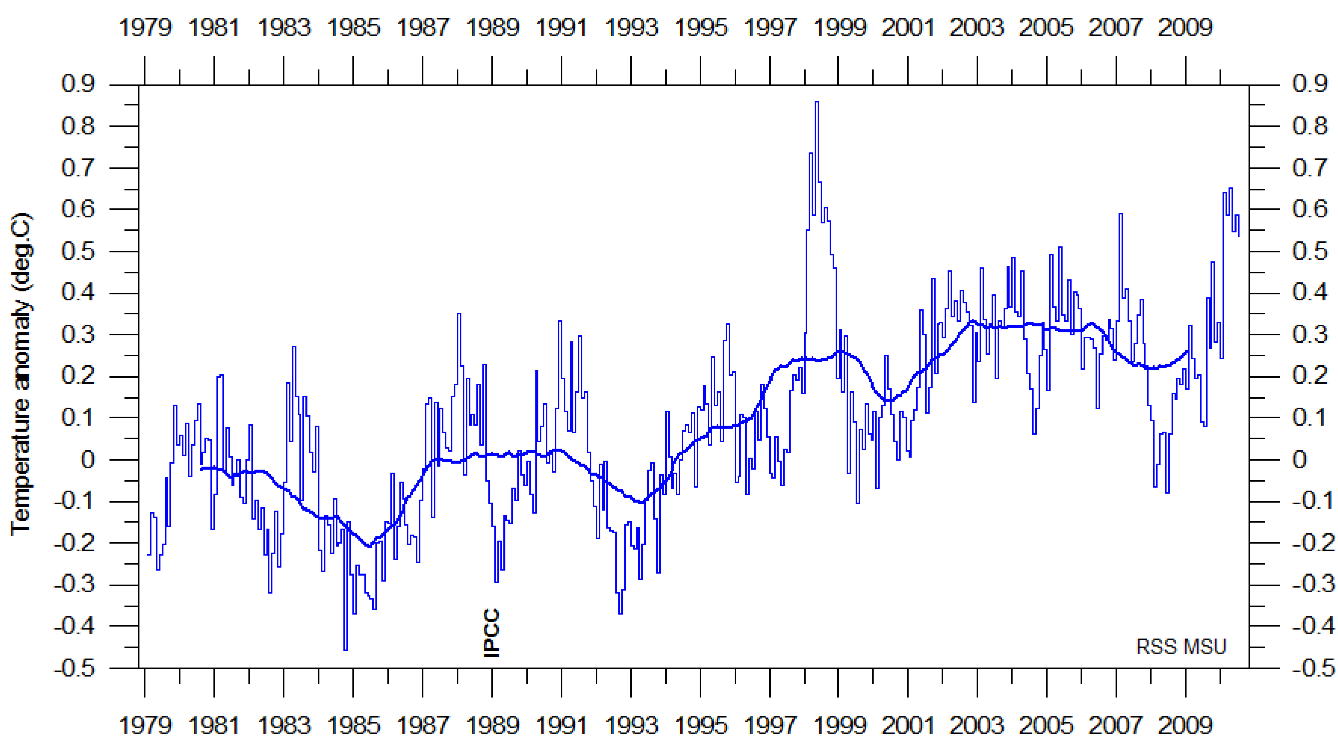
In the Antarctic relatively cold conditions characterised most of the areas, with the exception of the Antarctic Peninsula, which were relatively warm.

All diagrams shown in this newsletter are available for download on www.climate4you.com

[Lower troposphere temperature from satellites, updated to June 2010]

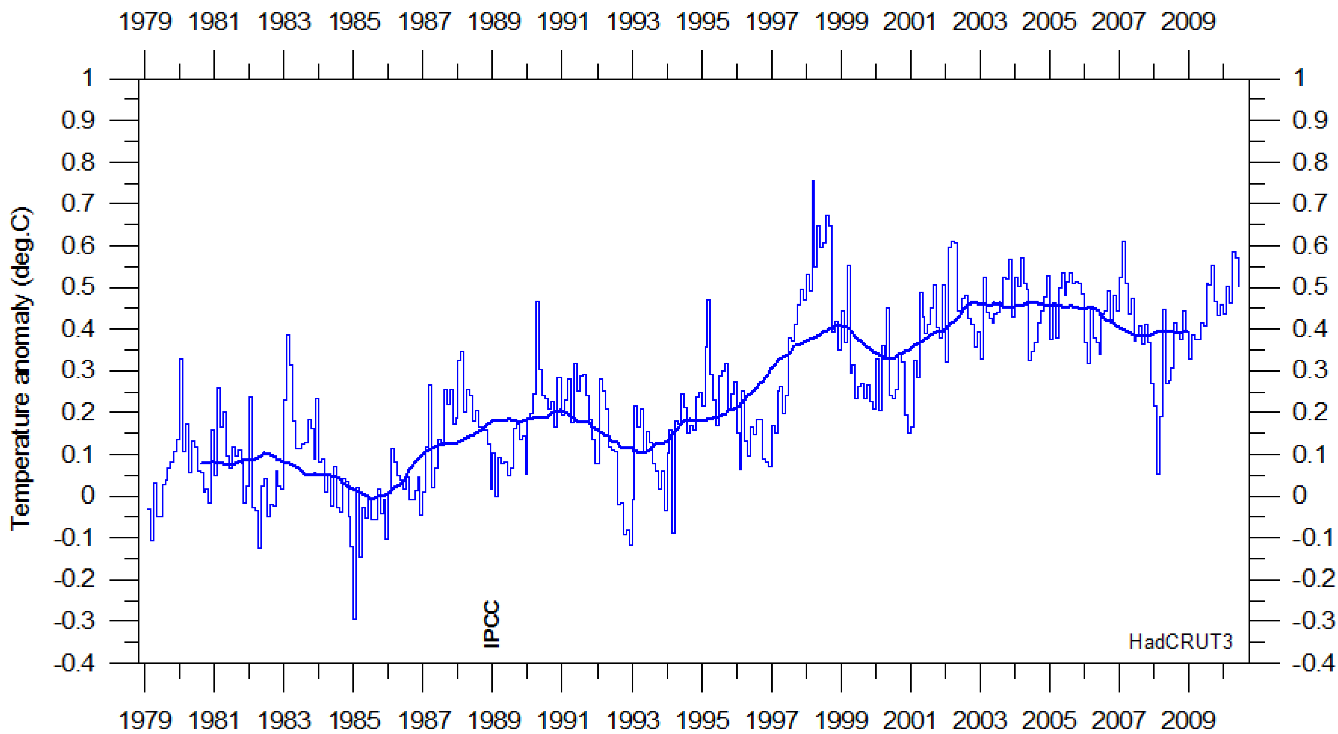


Global monthly average lower troposphere temperature (thin line) since 1979 according to [University of Alabama] at Huntsville, USA. The thick line is the simple running 37 month average.

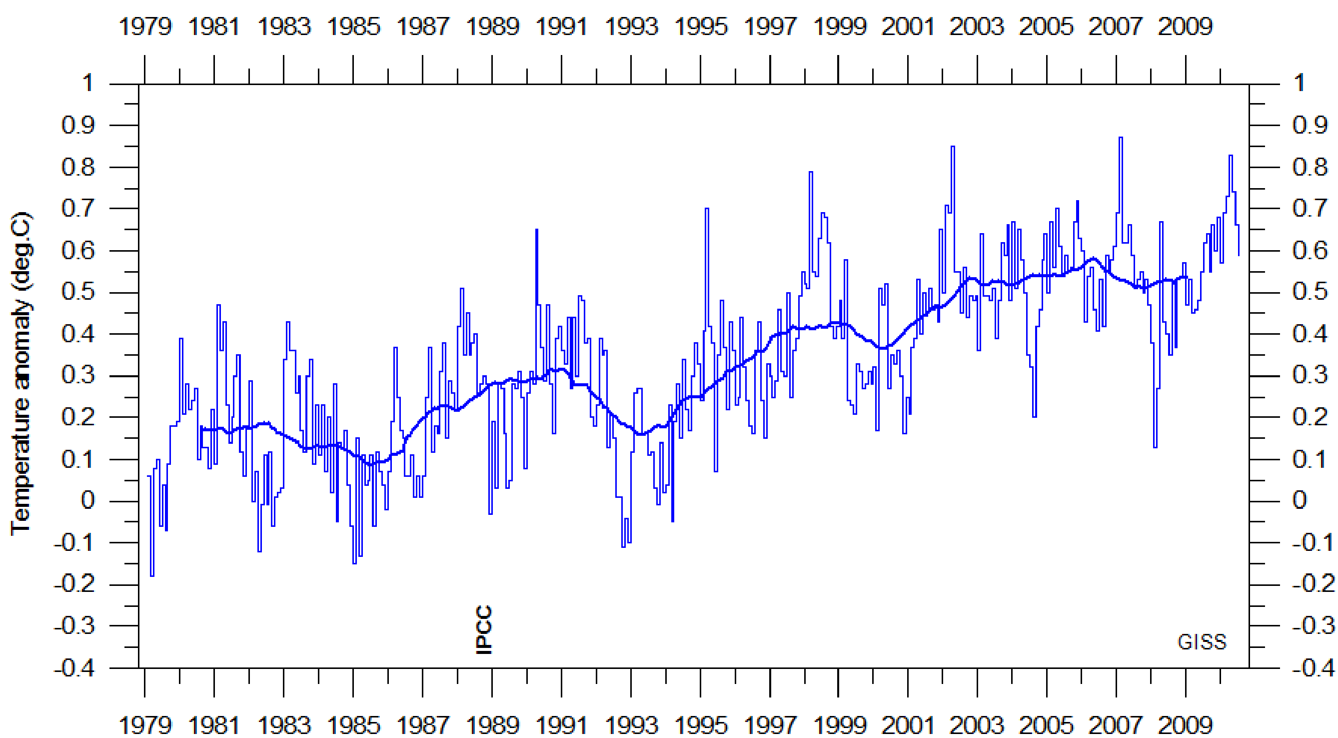


Global monthly average lower troposphere temperature (thin line) since 1979 according to according to [Remote Sensing Systems] (RSS), USA. The thick line is the simple running 37 month average.

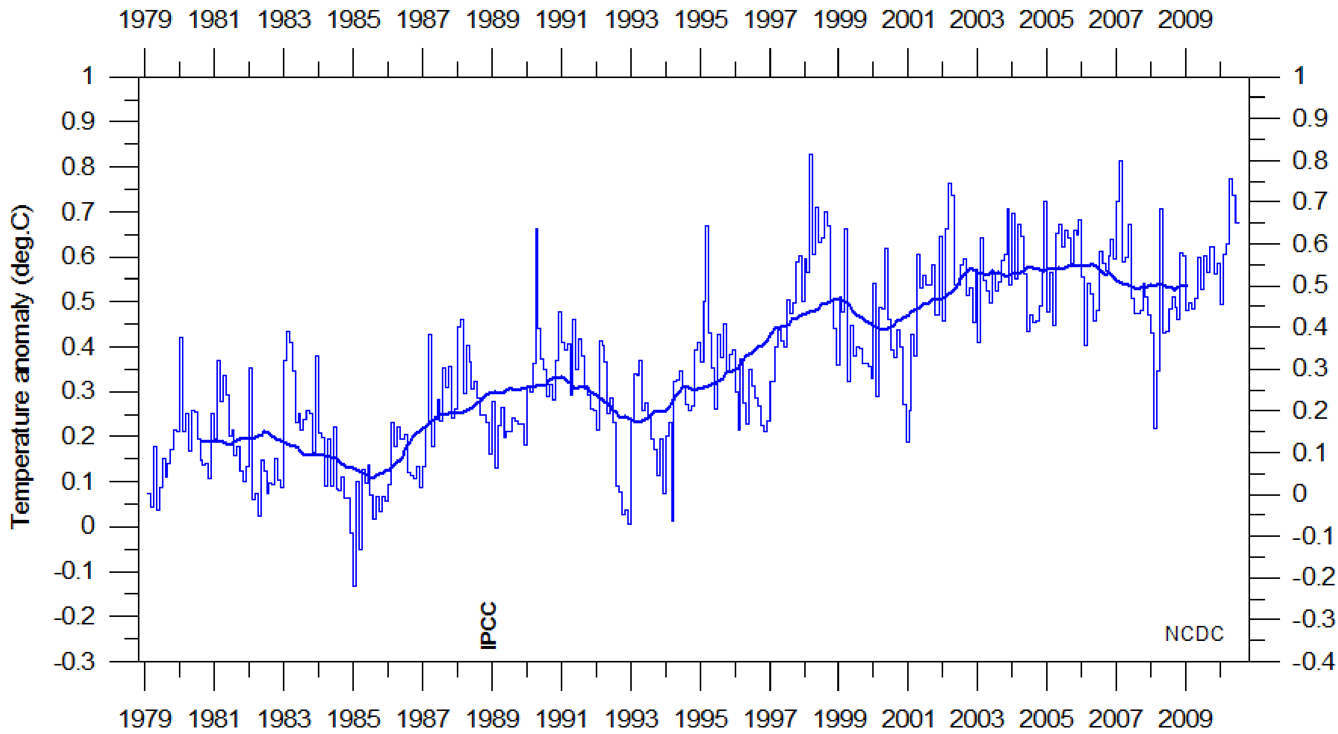
Global surface air temperature, updated to June 2010



Global monthly average surface air temperature (thin line) since 1979 according to according to the Hadley Centre for Climate Prediction and Research and the University of East Anglia's Climatic Research Unit (CRU), UK. The thick line is the simple running 37 month average. Please note that this record has not yet been updated beyond May 2010.



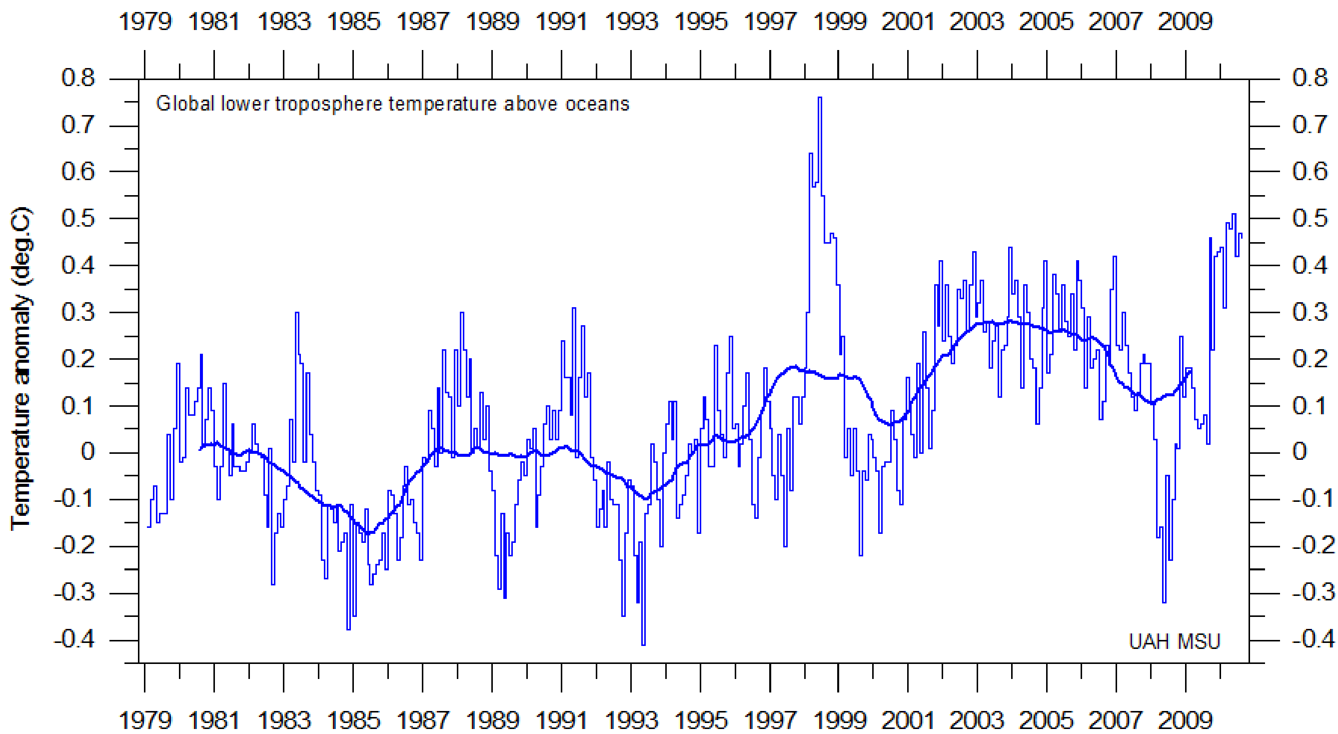
Global monthly average surface air temperature (thin line) since 1979 according to according to the Goddard Institute for Space Studies (GISS), at Columbia University, New York City, USA. The thick line is the simple running 37 month average.



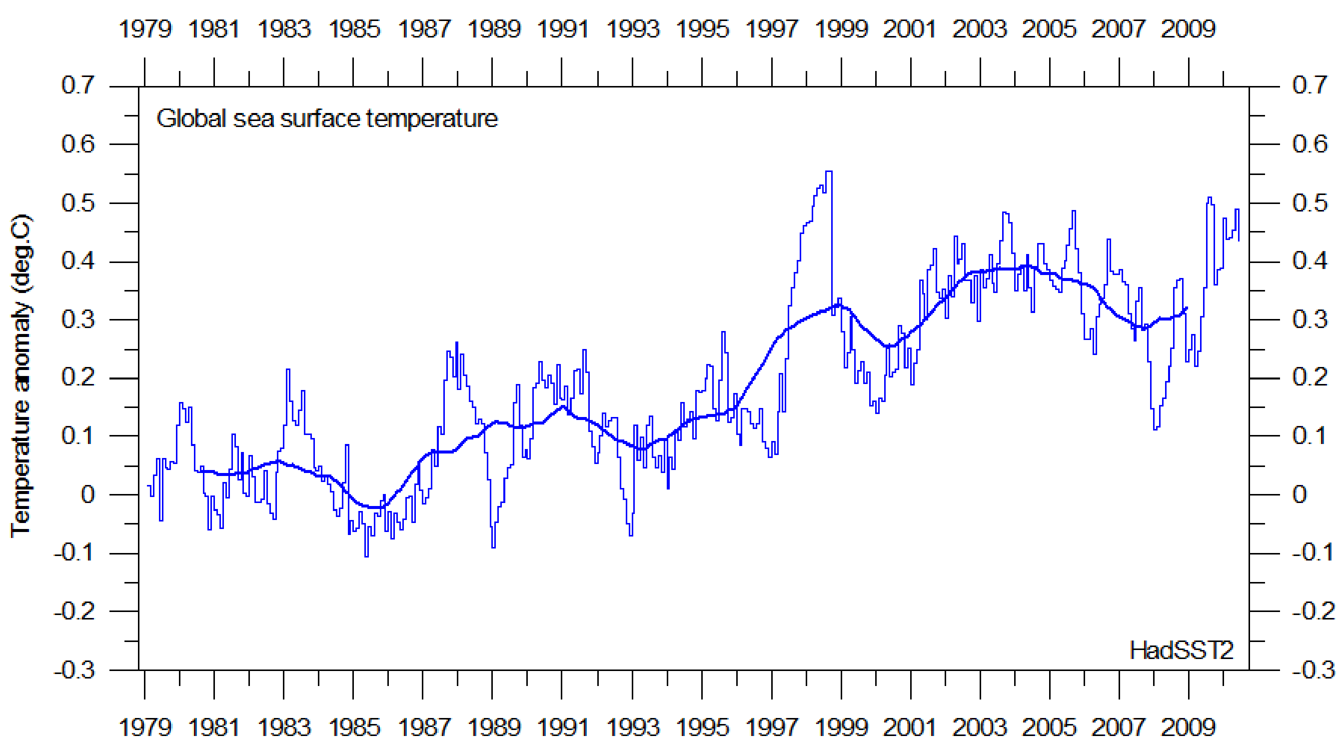
Global monthly average surface air temperature since 1979 according to according to the [National Climatic Data Center](#) (NCDC), USA. The thick line is the simple running 37 month average.

Some readers have noted that several of the above data series display changes when one compare with previous issues of this newsletter, not only for the most recent months, but actually for most of months included in the data series. The interested reader may find more on this lack of temporal stability on www.climate4you (go to: Global Temperature and then Temporal Stability).

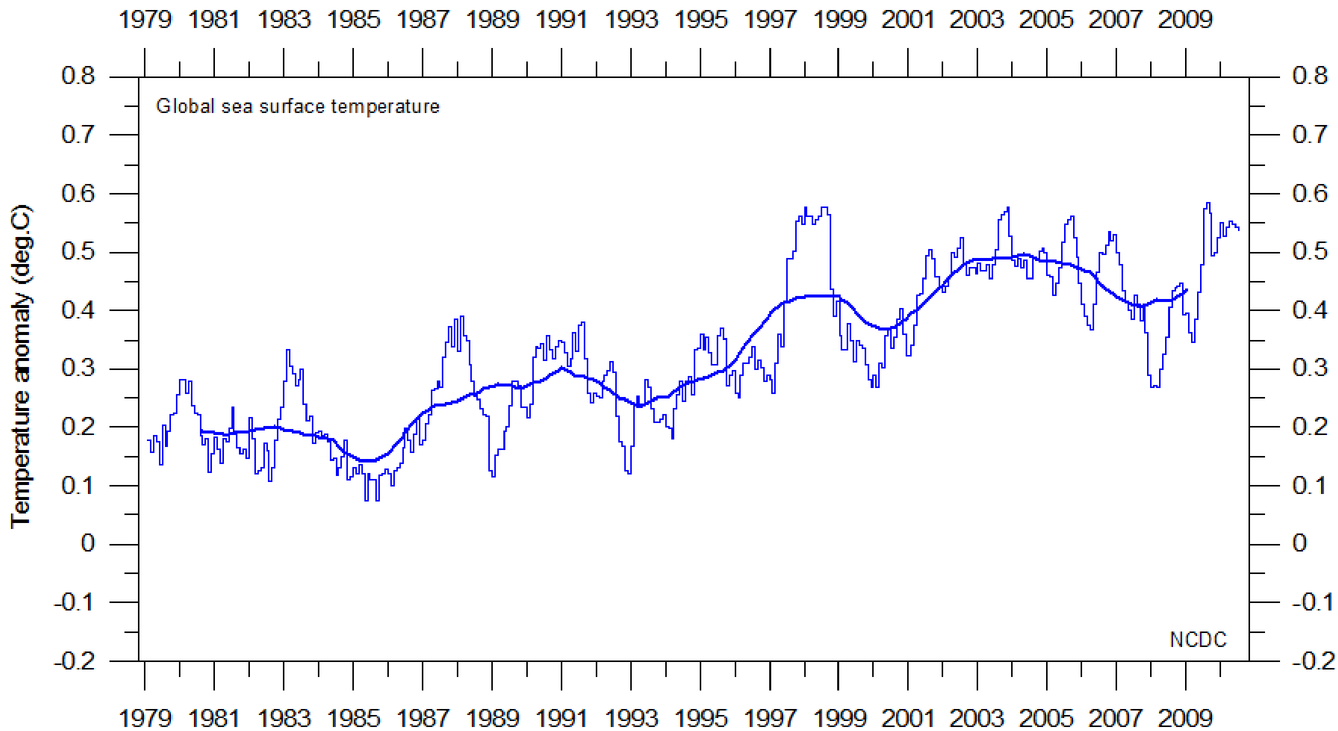
Global sea surface temperature, updated to June 2010



Global monthly average lower troposphere temperature over oceans (thin line) since 1979 according to University of Alabama at Huntsville, USA. The thick line is the simple running 37 month average.

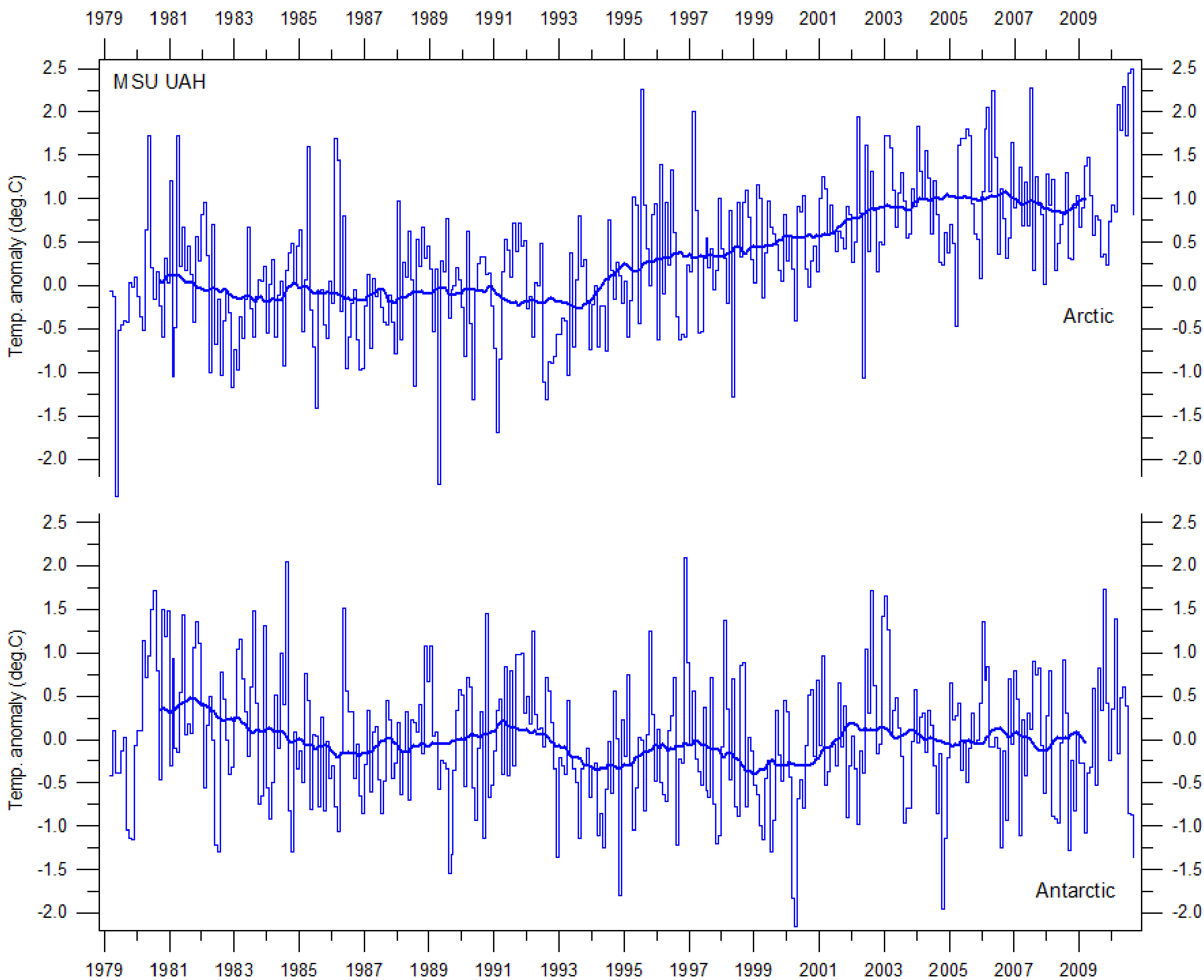


Global monthly average sea surface temperature since 1979 according to University of East Anglia's Climatic Research Unit (CRU), UK. Base period: 1961-1990. The thick line is the simple running 37 month average. Please note that this data series has not yet been updated beyond May 2010.



Global monthly average sea surface temperature since 1979 according to the [National Climatic Data Center](#) (NCDC), USA. Base period: 1901-2000. The thick line is the simple running 37 month average.

Arctic and Antarctic lower troposphere temperature, updated to June 2010



Global monthly average lower troposphere temperature since 1979 for the North Pole and South Pole regions, based on satellite observations (University of Alabama at Huntsville, USA). The thick line is the simple running 37 month average, nearly corresponding to a running 3 yr average.

Arctic and Antarctic surface air temperature, updated to May 2010

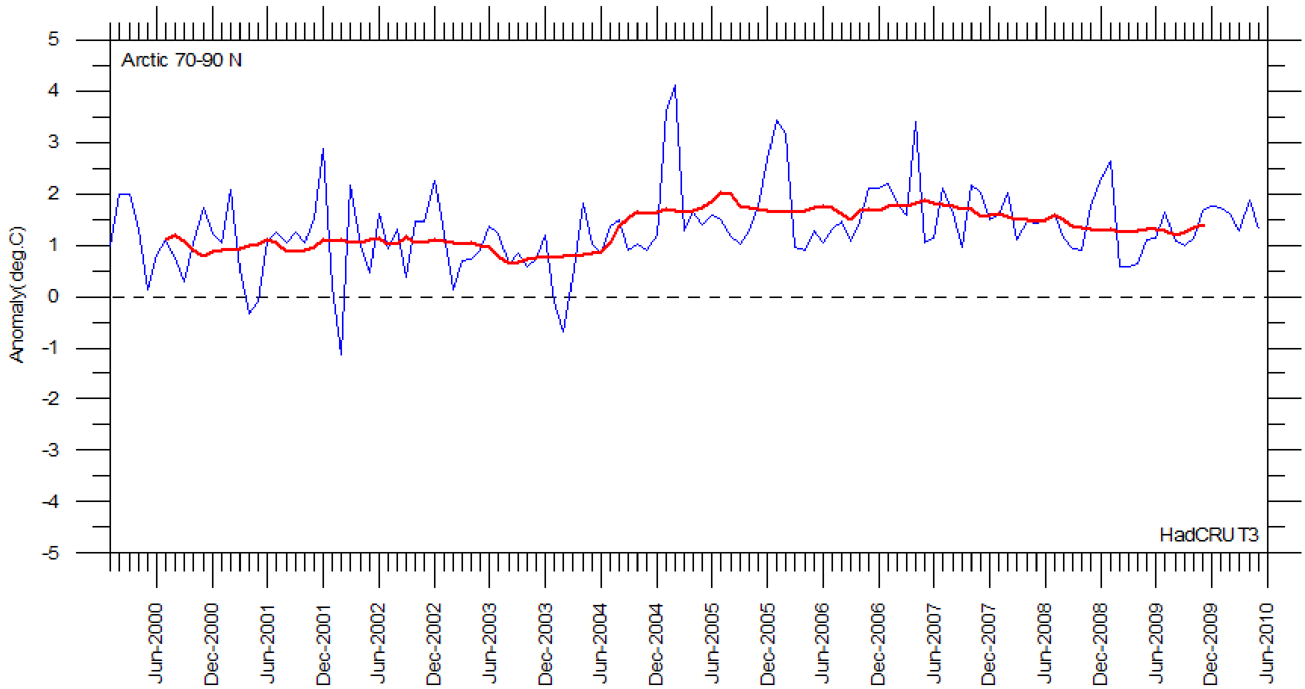


Diagram showing Arctic monthly surface air temperature anomaly 70-90°N since January 2000, in relation to the WMO reference "normal" period 1961-1990. The thin blue line shows the monthly temperature anomaly, while the thicker red line shows the running 13 month average. Data provided by the Hadley Centre for Climate Prediction and Research and the University of East Anglia's Climatic Research Unit (CRU), UK. Please note that this data series has not yet been updated beyond May 2010.

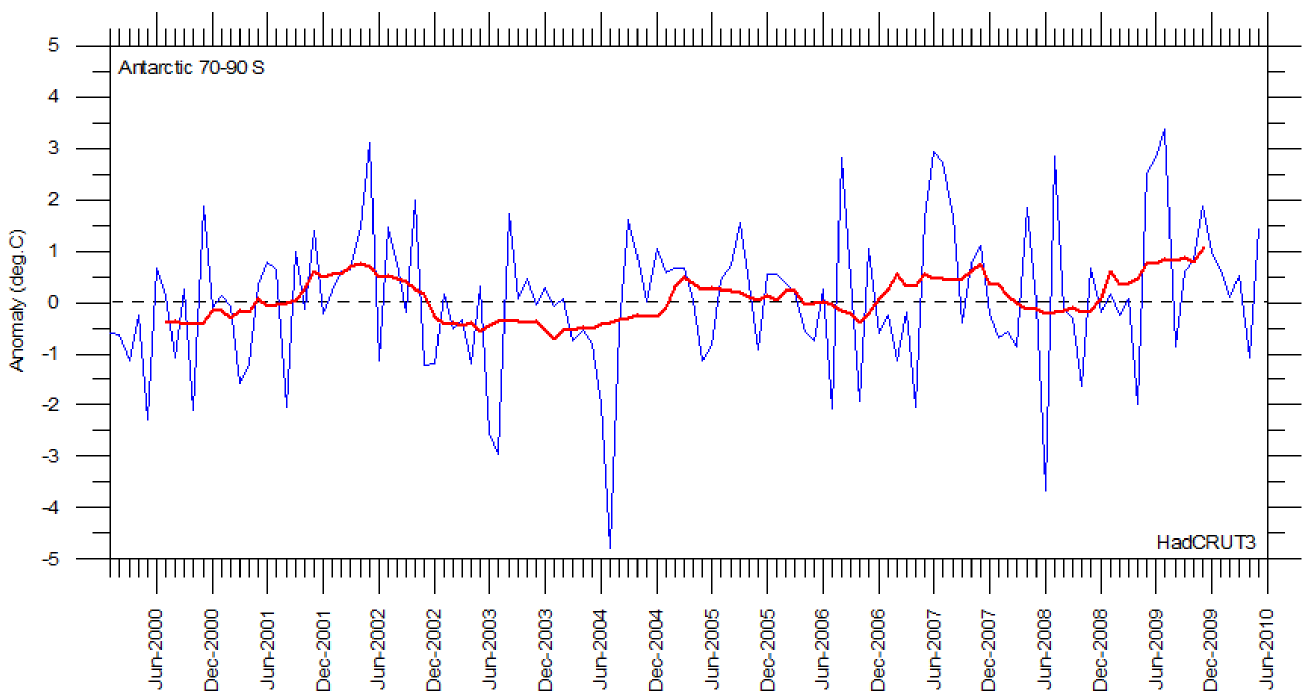


Diagram showing Antarctic monthly surface air temperature anomaly 70-90°S since January 2000, in relation to the WMO reference "normal" period 1961-1990. The thin blue line shows the monthly temperature anomaly, while the thicker red line shows the running 13 month average. Data provided by the Hadley Centre for Climate Prediction and Research and the University of East Anglia's Climatic Research Unit (CRU), UK. Please note that this data series has not yet been updated beyond May 2010.

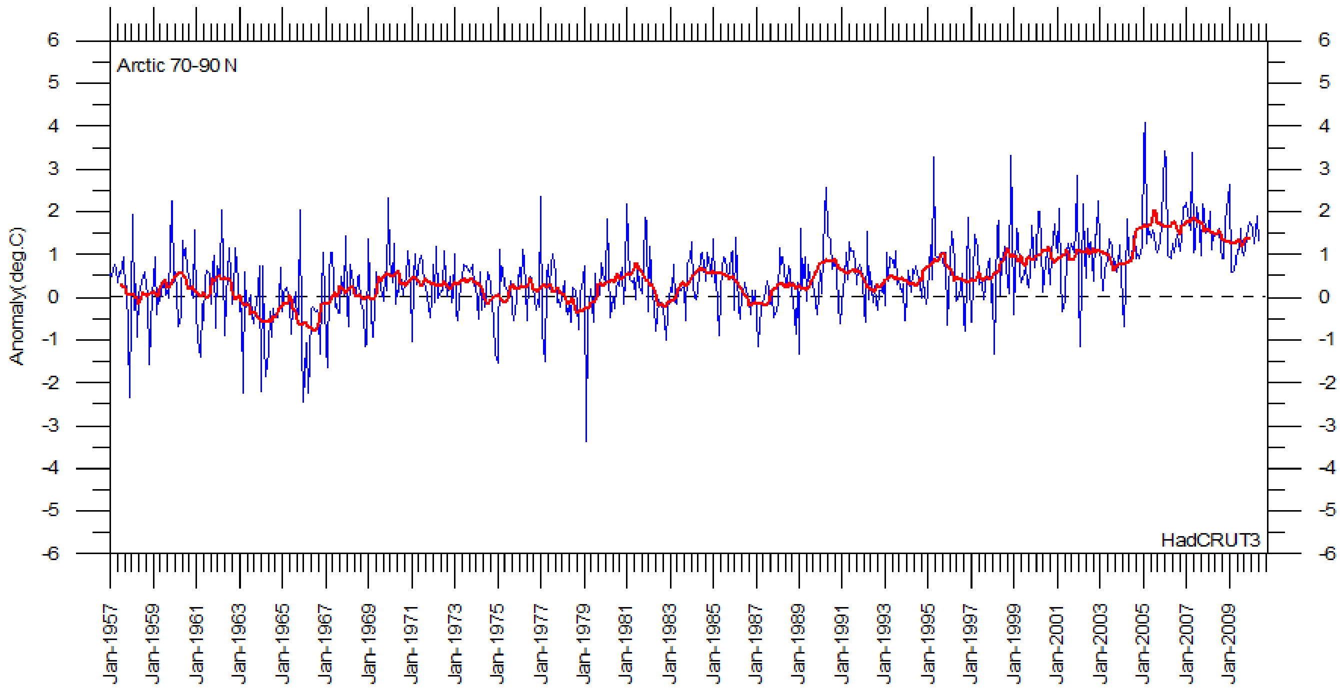


Diagram showing Arctic monthly surface air temperature anomaly 70-90°N since January 1957, in relation to the WMO reference "normal" period 1961-1990. The year 1957 has been chosen as starting year, to ensure easy comparison with the maximum length of the realistic Antarctic temperature record shown below. The thin blue line shows the monthly temperature anomaly, while the thicker red line shows the running 13 month average. Data provided by the Hadley Centre for Climate Prediction and Research and the University of East Anglia's [Climatic Research Unit] ([CRU]), UK. Please note that this data series has not yet been updated beyond May 2010.

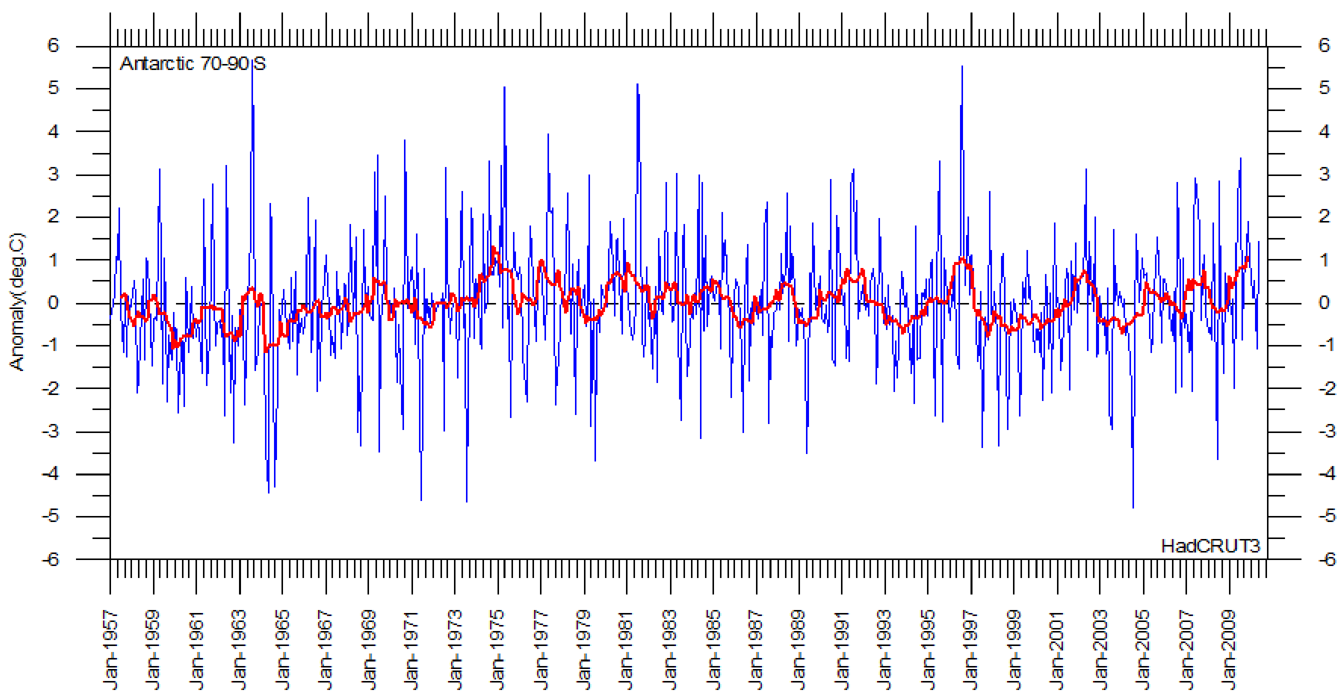


Diagram showing Antarctic monthly surface air temperature anomaly 70-90°S since January 1957, in relation to the WMO reference "normal" period 1961-1990. The year 1957 was an international geophysical year, and several meteorological stations were established in the Antarctic because of this. Before 1957, the meteorological coverage of the Antarctic continent is poor. The thin blue line shows the monthly temperature anomaly, while the thicker red line shows the running 13 month average. Data provided by the Hadley Centre for Climate Prediction and Research and the University of East Anglia's [Climatic Research Unit] ([CRU]), UK. Please note that this data series has not yet been updated beyond May 2010.

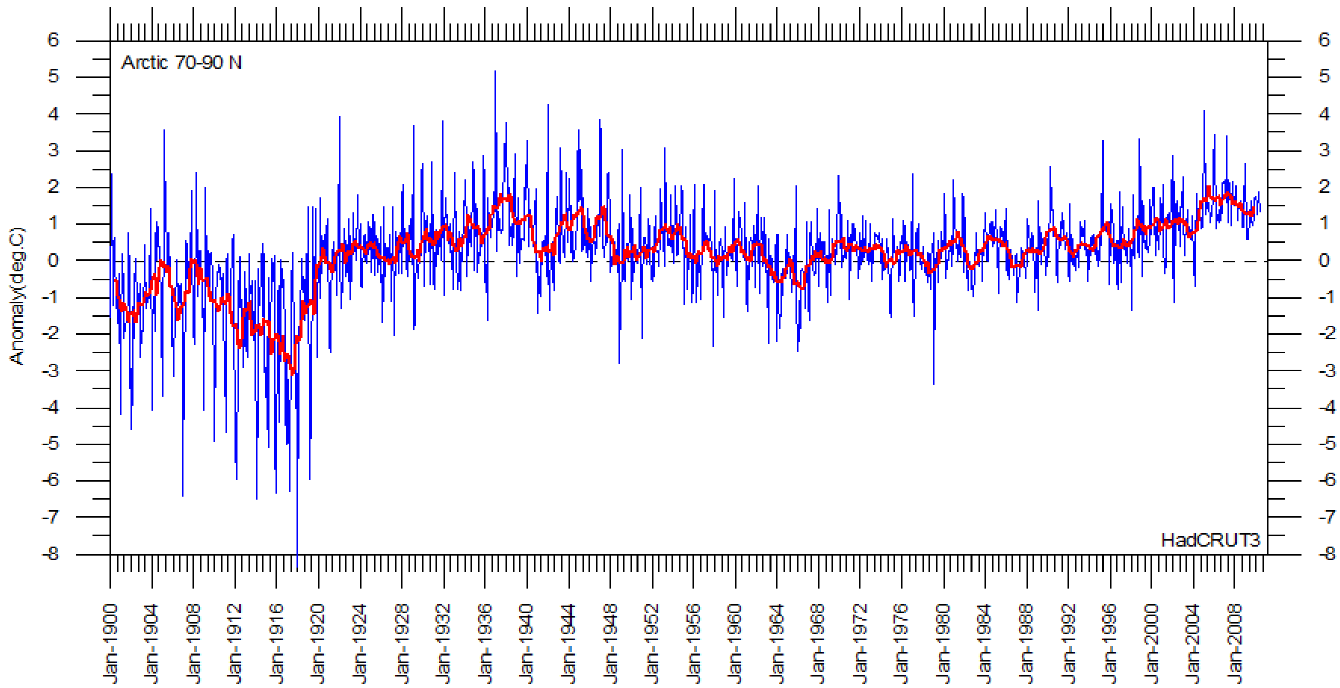


Diagram showing Arctic monthly surface air temperature anomaly 70-90^{o}N since January 1900, in relation to the WMO reference "normal" period 1961-1990. The thin blue line shows the monthly temperature anomaly, while the thicker red line shows the running 13 month average. In general, the range of monthly temperature variations decreases throughout the first 30-50 years of the record, reflecting the increasing number of meteorological stations north of 70^{o}N over time. Especially the period from about 1930 saw the establishment of many new Arctic meteorological stations, first in Russia and Siberia, and following the 2nd World War, also in North America. Because of the relatively small number of stations before 1930, details in the early part of the Arctic temperature record should not be over interpreted. The rapid Arctic warming around 1920 is, however, clearly visible, and is also documented by other sources of information. The period since 2000 is warm, about as warm as the period 1930-1940. Data provided by the Hadley Centre for Climate Prediction and Research and the University of East Anglia's Climatic Research Unit (CRU), UK. Please note that this data series has not yet been updated beyond May 2010.

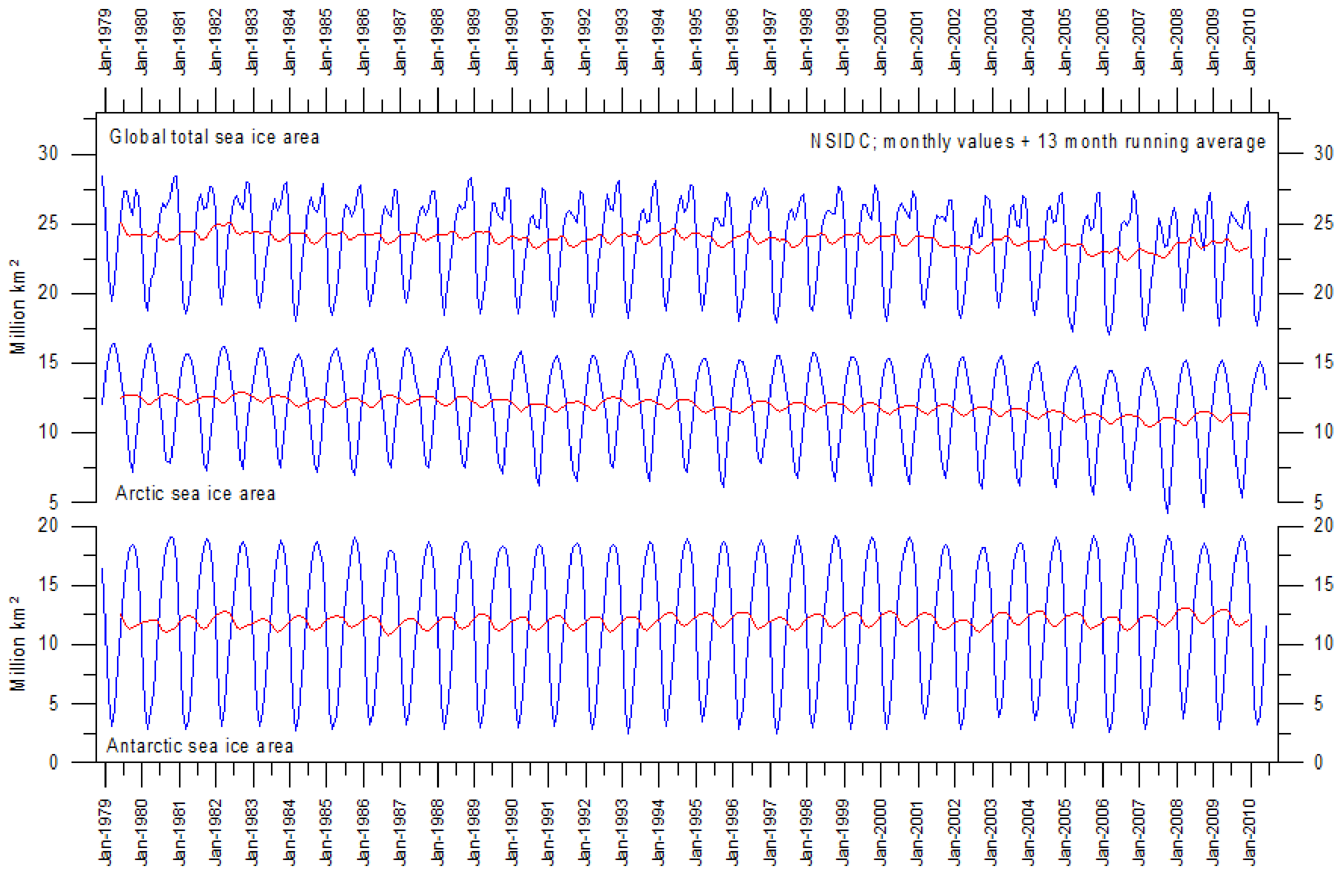
In general, the Arctic temperature record appears to be less variable than the contemporary Antarctic record, presumably at least partly due to the higher number of meteorological stations north of 70^{o}N, compared to the number of stations south of 70^{o}S.

As data coverage is sparse in the polar regions, the procedure of Gillet et al. 2008 has been followed, giving equal weight to data in each 5^{o}x5^{o} grid cell when calculating means, with no weighting by the areas of the grid dells.

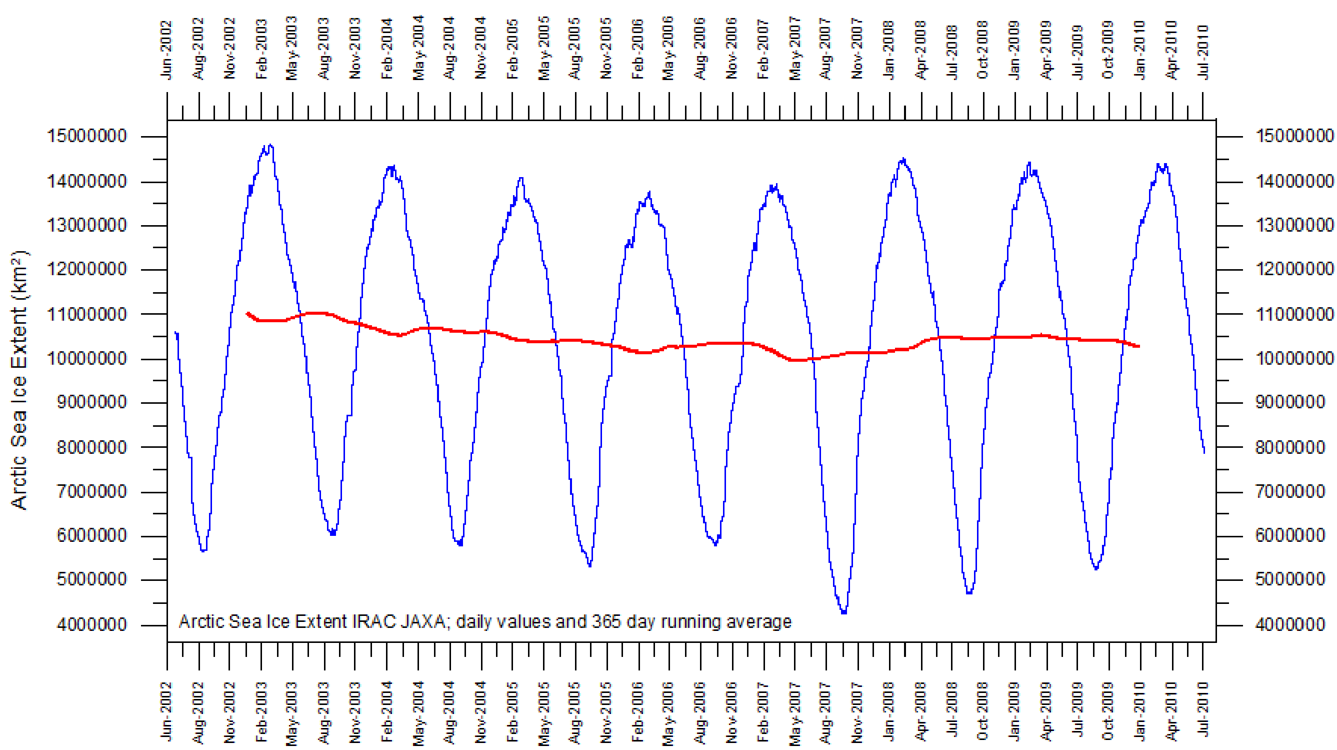
Litterature:

Gillett, N.P., Stone, D.A., Stott, P.A., Nozawa, T., Karpechko, A.Y.U., Hegerl, G.C., Wehner, M.F. and Jones, P.D. 2008. Attribution of polar warming to human influence. *Nature Geoscience* 1, 750-754.

[Arctic and Antarctic sea ice, updated to June 2010](#)

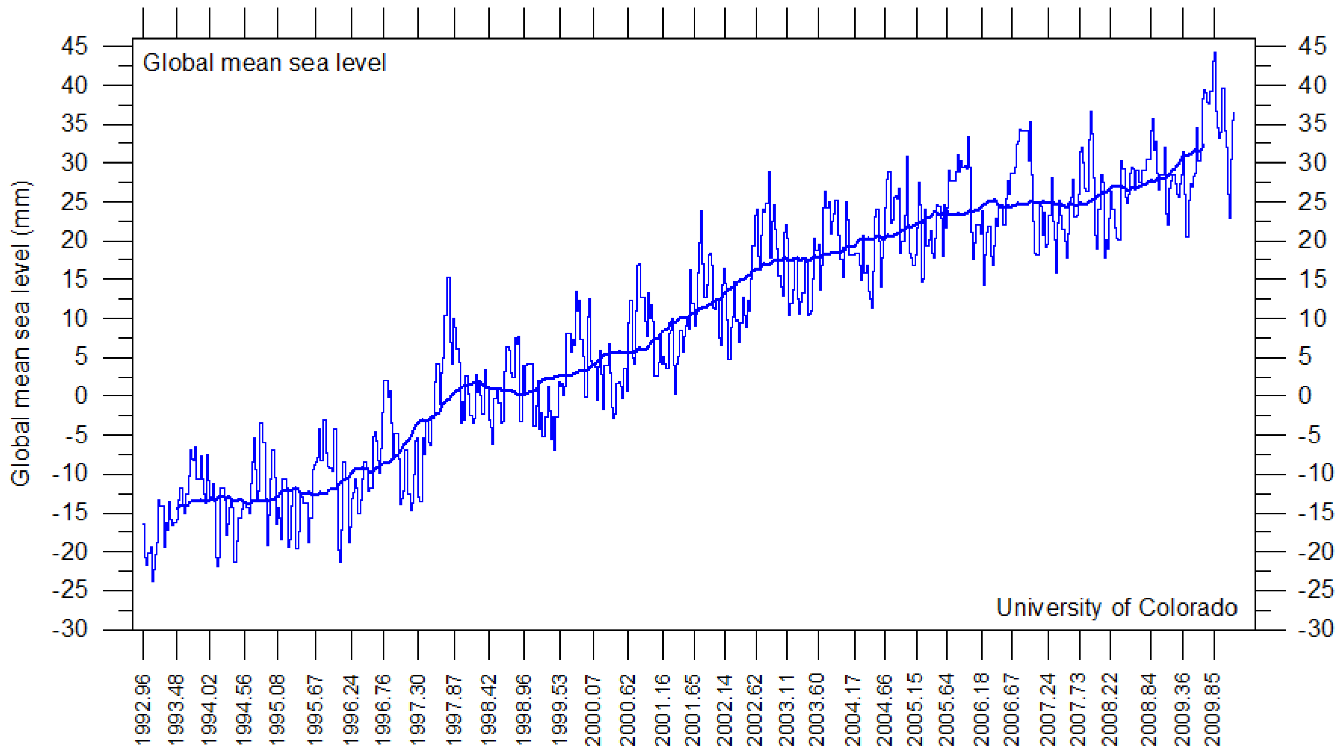


Graphs showing monthly Antarctic, Arctic and global sea ice extent since November 1978, according to the [National Snow and Ice data Center](#) (NSIDC).

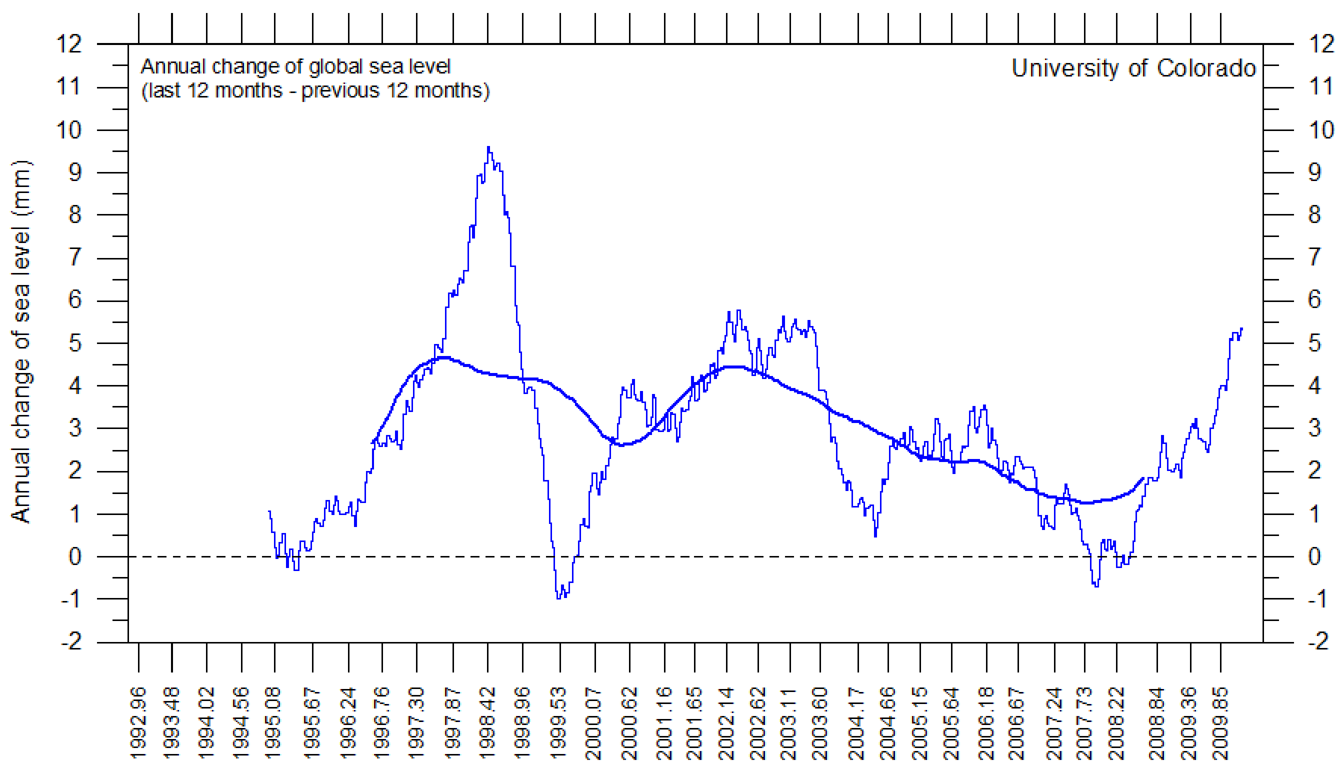


Graph showing daily Arctic sea ice extent since June 2002, to 18/07 2010, by courtesy of [Japan Aerospace Exploration Agency](#) (JAXA).

[Global sea level, updated to April 2010](#)

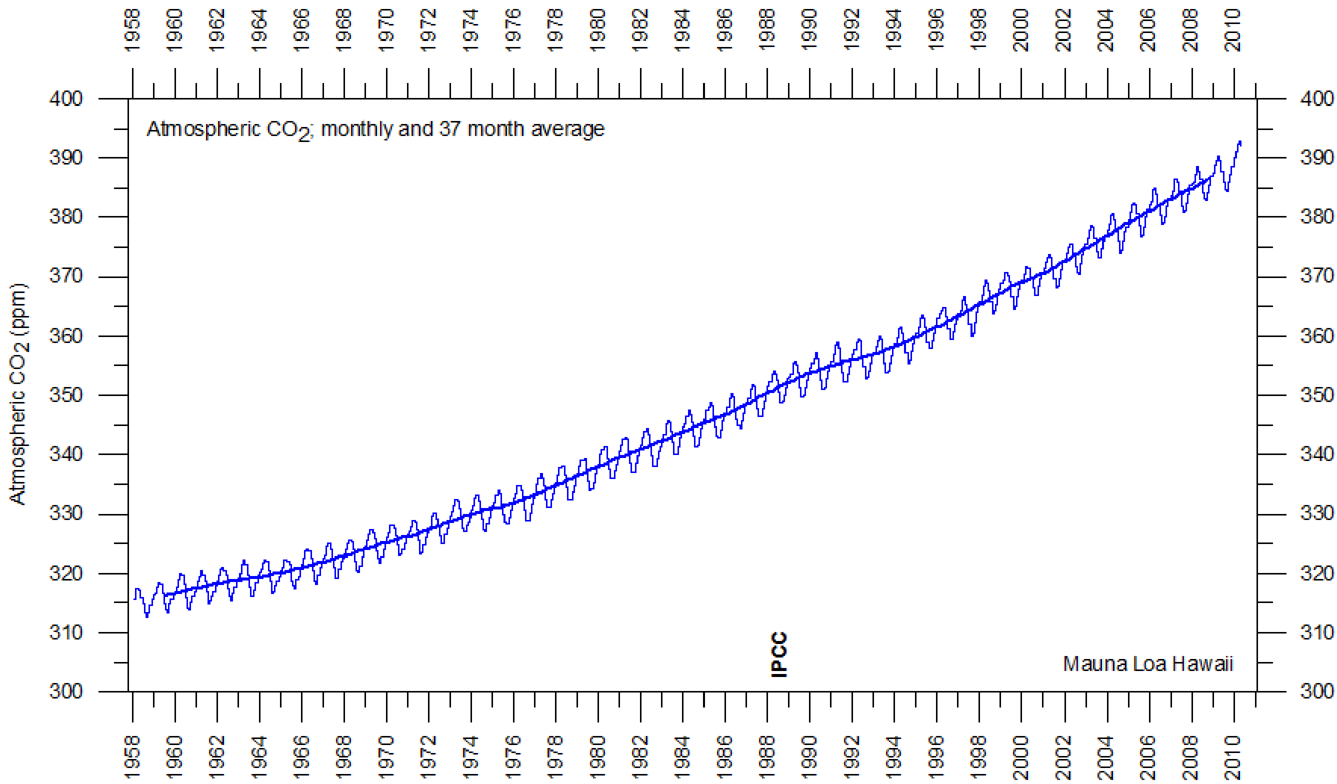


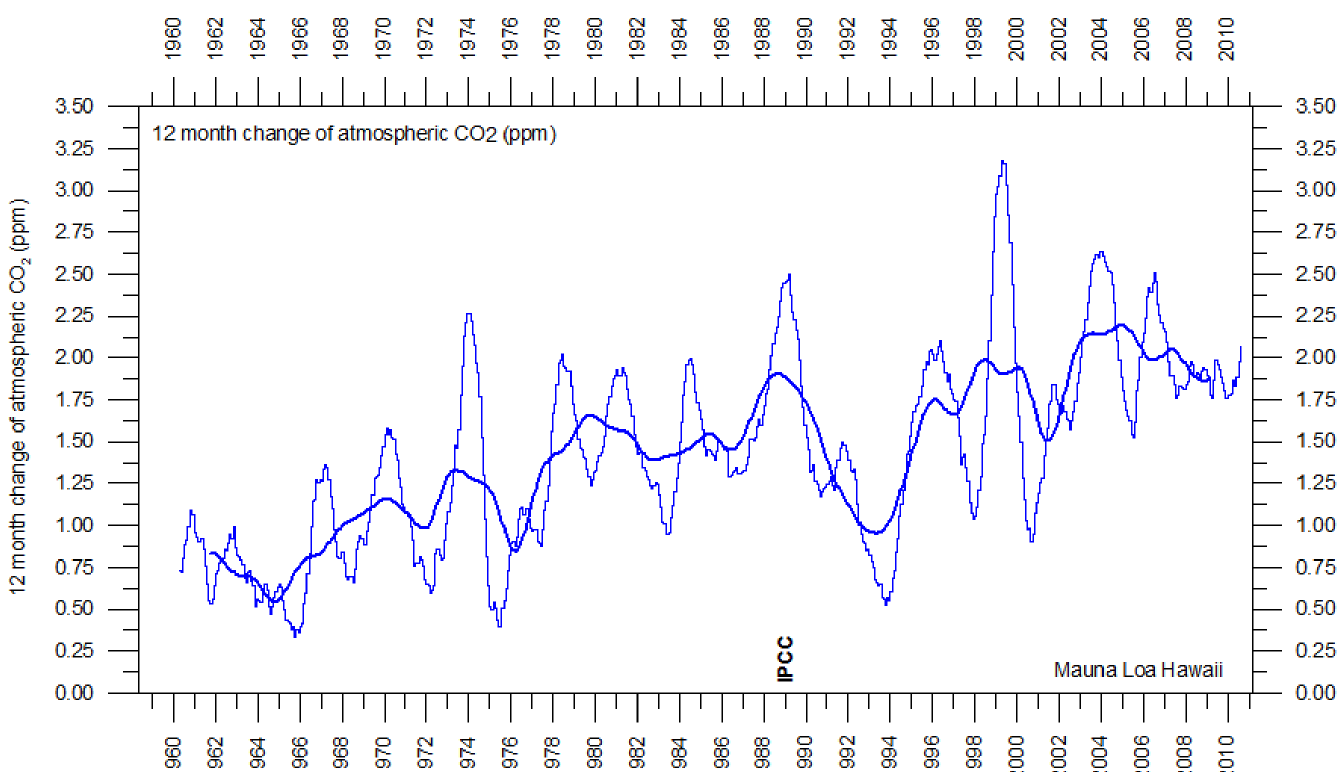
Globa lmonthly sea level since late 1992 according to the Colorado Center for Astrodynamics Research at [University of Colorado at Boulder](#), USA. The thick line is the simple running 37 observation average, nearly corresponding to a running 3 yr average.



Annual change of global sea level since late 1992 according to the Colorado Center for Astrodynamics Research at [University of Colorado at Boulder](#), USA. The thick line is the simple running 3 yr average.

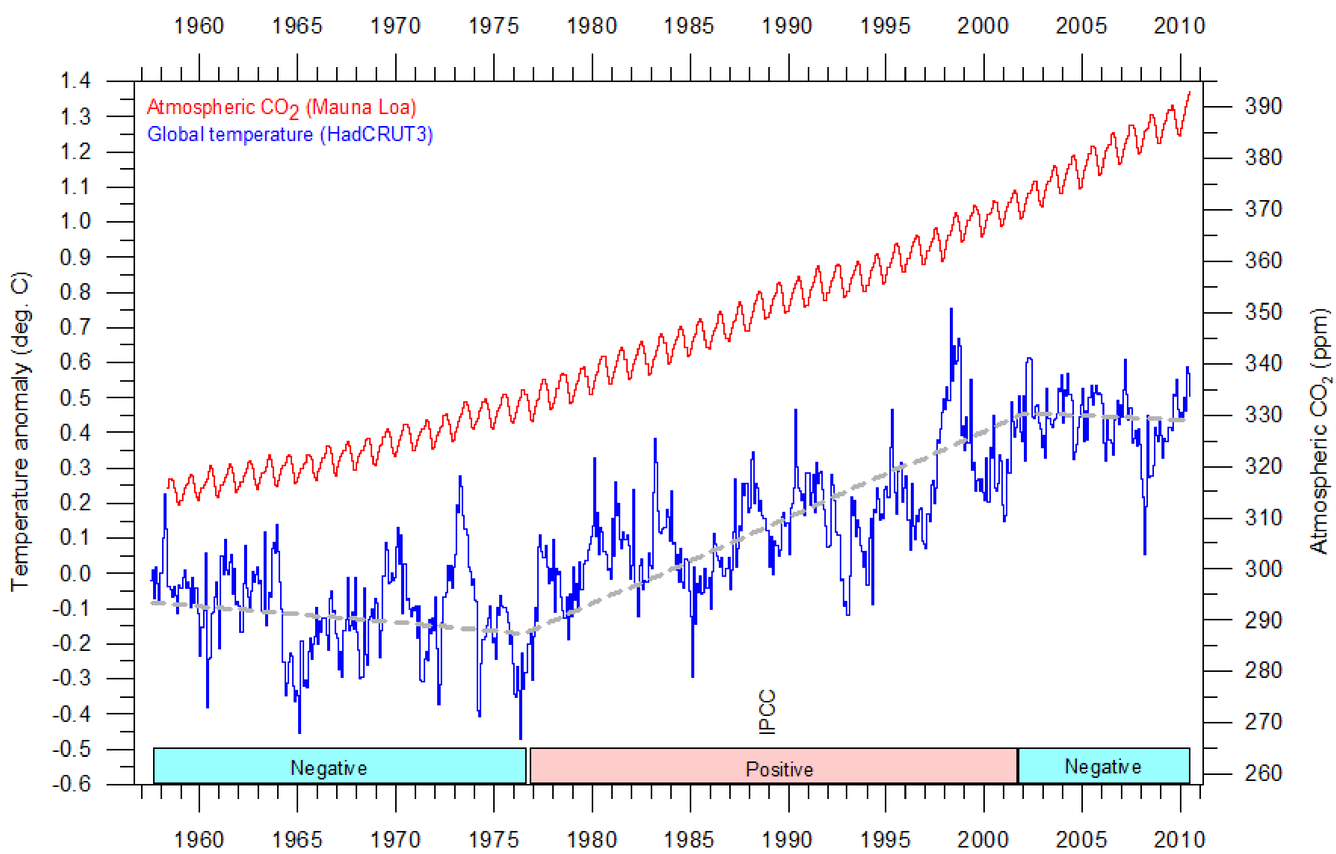
Atmospheric CO_2, updated to June 2010

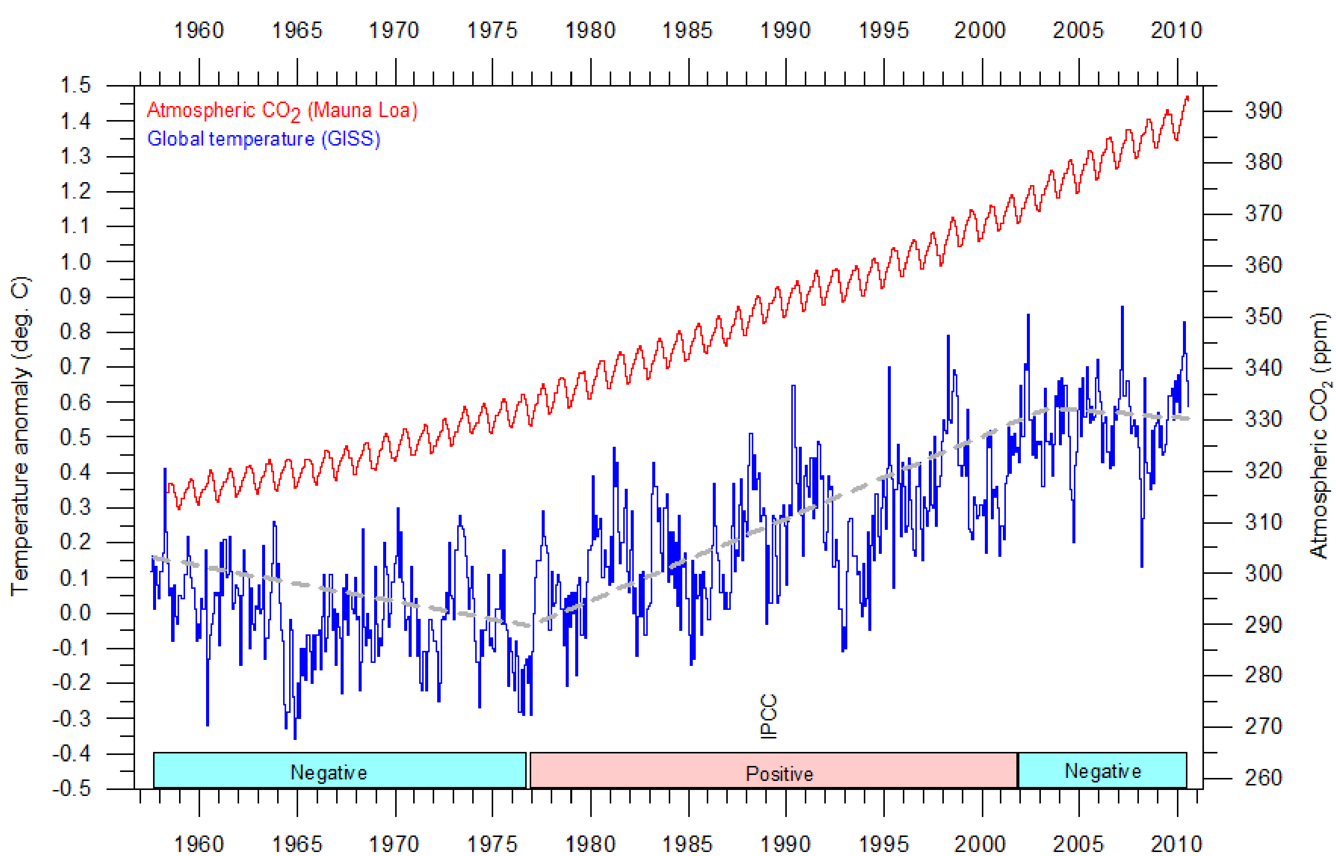


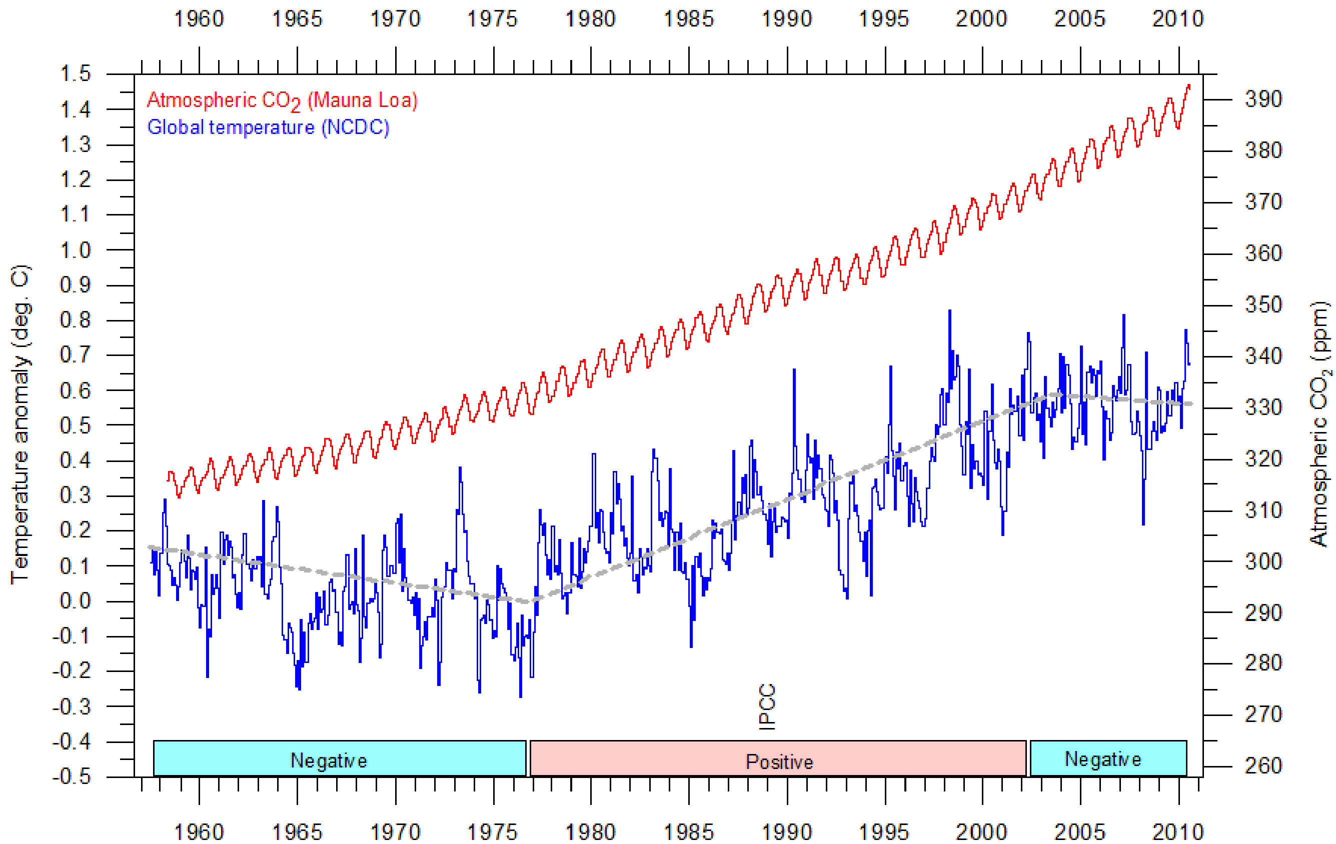


Monthly amount of atmospheric CO_2 (above) and annual growth rate (below; average last 12 months minus average preceding 12 months) of atmospheric CO_2 since 1959, according to data provided by the Mauna Loa Observatory, Hawaii, USA. The thick line is the simple running 37 observation average, nearly corresponding to a running 3 yr average.

Global surface air temperature and atmospheric CO_2, updated to June 2010







Diagrams showing HadCRUT3, GISS, and NCDC monthly global surface air temperature estimates (blue) and the monthly atmospheric CO_2 content (red) according to the [Mauna Loa Observatory](), Hawaii. The Mauna Loa data series begins in March 1958, and 1958 has therefore been chosen as starting year for the diagrams. Reconstructions of past atmospheric CO_2 concentrations (before 1958) are not incorporated in this diagram, as such past CO_2 values are derived by other means (ice cores, stomata, or older measurements using different methodology, and therefore are not directly comparable with modern atmospheric measurements. The dotted grey line indicates the approximate linear temperature trend, and the boxes in the lower part of the diagram indicate the relation between atmospheric CO_2 and global surface air temperature, negative or positive. Please note that the HadCRUT3 record has not been updated beyond May 2010.

Most climate models assume the greenhouse gas carbon dioxide CO_2 to influence significantly upon global temperature. Thus, it is relevant to compare the different global temperature records with measurements of atmospheric CO_2, as shown in the diagrams above. Any comparison, however, should not be made on a monthly or annual basis, but for a longer time period, as other effects (oceanographic, clouds, etc.) may well override the potential influence of CO_2 on short time scales such as just a few years.

It is of cause equally inappropriate to present new meteorological record values, whether daily, monthly or annual, as support for the hypothesis ascribing high importance of atmospheric CO_2 for global temperatures. Any such short-period meteorological record value may well be the result of other phenomena than atmospheric CO_2.

What exactly defines the critical length of a relevant time period to consider for evaluating the alleged high importance of CO_2 remains elusive, and is still a topic for debate. The critical period length must, however, be inversely proportional to the importance of CO_2 on the global temperature, including feedback effects, such as assumed by most climate models. So if the effect of CO_2 is strong, the length of the critical period is short.

After about 10 years of global temperature increase following global cooling 1940-1978, IPCC was established in 1988. Presumably, several scientists interested in climate then felt intuitively that their empirical and theoretical understanding of climate dynamics was sufficient to conclude about the high importance of CO_2 for global temperature. However, for obtaining public and political support for the CO_2-hyphotesis the 10 year warming period leading up to 1988 in all likelihood was important. Had the global temperature instead been decreasing, public support for the hypothesis would have been difficult to obtain. Adopting this approach as to critical time length, the varying relation (positive or negative) between global temperature and atmospheric CO_2 has been indicated in the lower panels of the three diagrams above.

[Climate and history; one example among many]

1960-1975: Global cooling and the prospect of a coming ice age

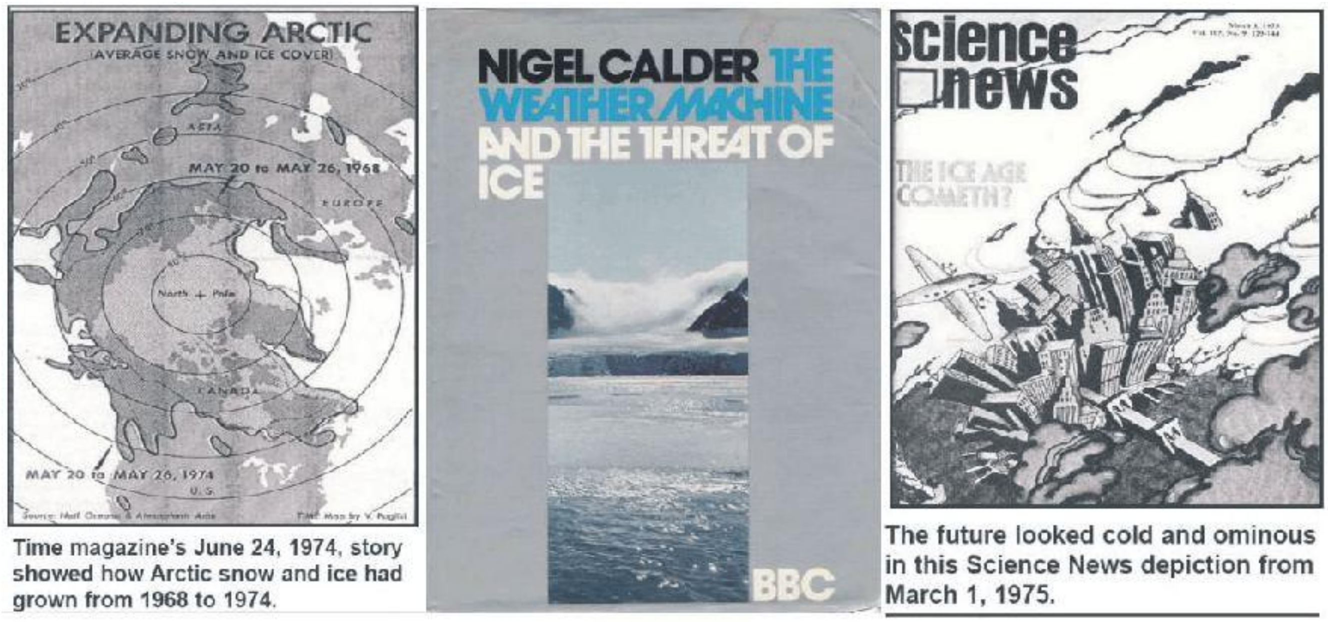


Illustration from Time magazine June 24, 1974 (left). Frontcover of Nigel Calder's 1974 *book entitled The Weather Machine and the Treat of Ice (centre). Illustration from Newsweek, March 1, 1975 (right).*

In the 1960s and early 1970s, the time frame of most scientists was still retrospective, rather than prospective (Oldfield 1993). However, the revived notion of the Milankovitch theory then suddenly offered the new possibility of actual climate prediction. At that time there was relatively little emphasis on potential or actual ‘global warming’, and the idea was virtually unknown to popular consciousness. Indeed, a widespread belief at that time was that the planet was heading for a new ice age, fuelled by acceptance of the Milankovitch theory and new knowledge gained from isotope analysis of Greenland ice cores (Dansgaard et al. 1970, 1971).

Hays et al. (1976) suggested that the observed orbital-climate relationships predict that the long-term trend over the next several thousand years would be toward extensive Northern Hemisphere glaciation. The period of global cooling since around 1940 was thought to be the first indication of a new ice age, and was seen as being accelerated by aerosols from industrial pollution blocking out sunlight. Even among some of those scientists drawing attention to contemporary increases of atmospheric CO_2, a phase of significant global cooling was envisaged (e.g. Rasool and Schneider 1971).

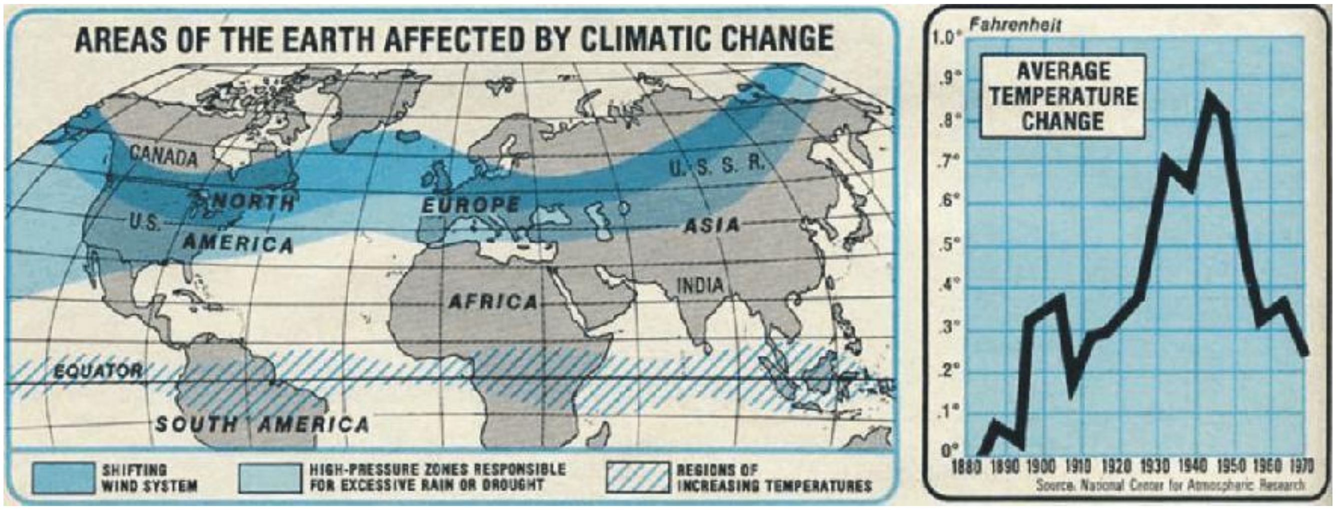


Diagram from Peter Gwynne's 1975 article entitled The Cooling World, published in Newsweek, April 28 (see text below).

Decreasing global surface air temperatures such as illustrated in the figure above were frequently taken as the empirical evidence for a coming ice age (e.g. Calder 1974; Ponte 1976). Such concerns in the mid-1970s brought together atmospheric scientists and the US Central Intelligence Agency (CIA) in an attempt to determine the geopolitical consequences of a sudden onset of global cooling.

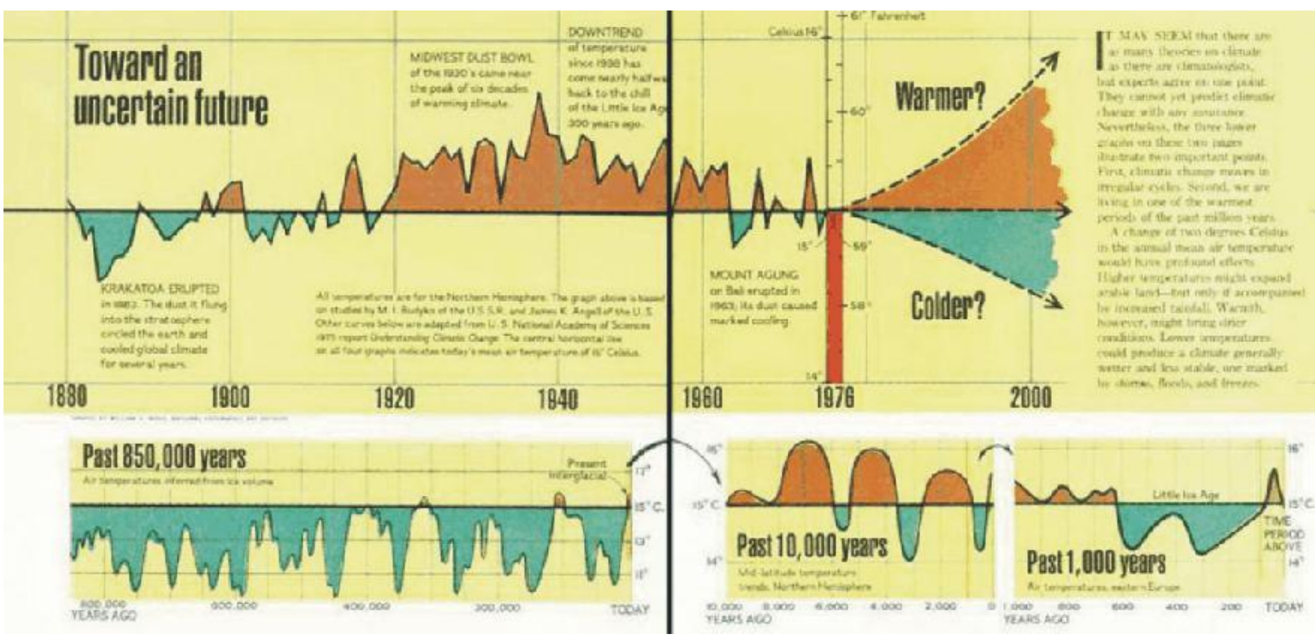
The journal Newsweek in an article 28 April 1975 stated the following (Gwynne 1975):

"There are ominous signs that the earth's weather patterns have begun to change dramatically and that these changes may portend a drastic decline in food production – with serious political implications for just about every nation on Earth. The drop in food output could begin quite soon, perhaps only ten years from now. The regions destined to feel its impact are the great wheat-producing lands of Canada and the U.S.S.R in the north, along with a number of marginally self-sufficient tropical areas – parts of India, Pakistan, Bangladesh, Indochina and Indonesia – where the growing season is dependent upon the rains brought by the monsoon.

The evidence in support of these predictions has now begun to accumulate so massively that meteorologists are hard-pressed to keep up with it. In England, farmers have seen their growing season decline by about two weeks since 1950, with a resultant over-all loss in grain production estimated at up to 100,000 tons annually. During the same time, the average temperature around the equator has risen by a fraction of a degree – a fraction that in some areas can mean drought and desolation. Last April, in the most devastating outbreak of tornadoes ever recorded, 148 twisters killed more than 300 people and caused half a billion dollars' worth of damage in thirteen U.S. states.

Trend: To scientists, these seemingly disparate incidents represents the advance signs of fundamental changes in the world's weather. The central fact is that after three quarters of a century of extraordinarily mild conditions, the earth's climate seems to be cooling down. Meteorologists disagree about the cause and extent of the cooling trend, as well as over its specific impact on local weather conditions. But they are almost unanimous in the view that the trend will reduce agricultural productivity for the rest of the century. If the climatic change is as profound as some of the pessimists fear, the resulting famines could be catastrophic……

…..Climatologists are pessimistic that political leaders will take any positive action to compensate for the climate change, or even to allay its effects. They concede that some of the more spectacular solutions proposed, such as melting of the arctic ice cap by covering it with black soot or diverting arctic rivers, might create problems far greater than those they solve. But the scientists see few signs that government leaders anywhere are even prepared to take the simple measures of stockpiling food or introducing the variables of climatic uncertainty into economic projections of future food supplies. The longer the planners delay, the more difficult will they find it to cope with climatic change once the results become grim reality".



An example of climate prediction made in year 1976.

References:

Calder, N. 1974. *The Weather Machine and the Threat of Ice.* British Broadcasting Corporation (BBC), London, 143.

Dansgaard, W., Johnsen, S.J. and Clausen, H.B. 1970. Vi går mot bistra tider. *Forskning och Framsteg* 8(7), 11-15.

Dansgaard, W., Johnsen, S., Clausen, H.B. and Langway, C.C., Jr. 1971. *Climatic record revealed by the Camp Century ice core.* In: K.K. Turekian (ed.), Late Cenozoic glacial ages. Yale Univ. Press, New Haven and London, 37-56.

Hays, J.D., Imbrie, J. and Shackleton , N.J. 1976. Variations in the Earth's orbit: pacemaker of the ice ages. *Science* 194, 1121-1132.

Oldfield, F. 1993. *Forward to the past: changing approaches to Quaternary palaeoecology*. In Chambers, F.M. (ed.), Climate change and human impact on the landscape. Chapman and Hall, London, 3-9.

Rasool, S. and Schneider, S. 1971. Atmospheric carbon dioxide and aerosols – effects of large increases on global climate. *Science* 173, 138-141.

All above diagrams with supplementary information, including links to data sources, are available on www.climate4you.com

Yours sincerely, Ole Humlum (Ole.Humlum@geo.uio.no)

20 July 2010.